

SAPPHIRE CHAIN: SIJI GREENWAY, BAOAN, SHENZHEN

Project Statement

Environmental pollution, conflicts between people and land, and insufficient ecological recreational resources caused by rapid urban development are becoming increasingly prominent. This project activates multiple closed reservoirs in the suburban area of Bao'an District, Shenzhen, through a greenway connection, forming a sapphire chain. Siji Greenway connects mountains and waters on one side and the city on the other, connecting the urban areas and suburban trails in series, building a connective pathway system, and activating the vitality of the area. In addition, the greenway repairs the surrounding ecological resources, forming a biological corridor connecting Fenghuang Mountain to Wuzhipa Forest Park, and creating animals habitat. Through diverse shoreline topography, purification of reservoir water quality, and restoration of quarry brownfields, citizens' activities are introduced on the premise of ensuring that animals and plants are not disturbed, meeting people's needs to understand and get close to nature, and achieving harmonious coexistence between man and nature.

PROJECT NARRATIVE

Background and Problem

Shenzhen is a megacity with high-density development. Its population has exceeded 20 million. The green space resources in the city center are in short supply. Most parks are small in size and cannot meet people's growing demand for outdoor sports such as camping, hiking, and cycling. More and more people tend to go to the suburbs to play and seek a wider natural landscape experience.

Mountains and the sea surround Bao'an District. There are continuous mountains, rivers, and reservoirs in the district. However, because the reservoirs were previously used as backup water sources, they were all managed in closed management, blocked by fences, and covered by vegetation, and could not bear the corresponding ecological recreation function. How to integrate these unique mountain and water resources into the city is one of the important issues in the development of the high-density city.

The Project aims to optimize the line selection and transformation and upgrading based on the existing greenway, connect 5 reservoirs, and integrate various natural resources such as surrounding farmland, reservoirs, quarry, wetlands, forests, etc. into the greenway. It connects people and nature and realizes the beautiful vision of harmonious coexistence between animals and plants.

Strategies

Strategies 1- Connecting

Utilize existing greenways, roadside green spaces, and reservoir patrol roads to build a connective pathway system, connect ecological patches such as reservoirs and parks, connect urban areas and suburban trails, and connect people and nature. Open the reservoir fences and move them out of sight, carry out landscape transformation, add viewing platforms, observation towers, bird-watching houses, and other facilities to overlook the lake view and water birds. Appropriately place a multi-level trail system of forest and farmland, add overhead boardwalks, handmade paths, wetland trails, etc., People could shuttle between forests, farmlands, and waterfronts. A pastoral and forest experience place is created for picking, stream tracking, bird watching, camping, and other activities.

Strategies 2- Protecting

Through surveys of multiple field species and the placing of infrared cameras to capture wildlife activities, the types of biological communities, and their range of activities around the site were learned by the design team. The greenway is equipped with biological bridges, green belts, underground passages, etc., to build a biological corridor connecting Fenghuang Mountain to Wuzhipa Forest Park, achieving barrier-free passage for animals in the two places, and setting up biological friendly facilities to minimize interference from artificial structures, providing a safe and friendly living space for wild animals. Combined with characteristic trails, interactive science facilities are placed to allow people a better knowledge of these creatures of nature.

PROJECT NARRATIVE

Strategies 3- Restoring

The design team creates a variety of shoreline terrain, shallows, islands, wetlands, Low-lying Ponds, etc., enriching plant communities, restoring waterside habitats, and purifying reservoir water quality by creating surface and subsurface wetlands. For Fengyan Reservoir, first, comb the site vegetation, remove invasive plants such as *Leucaena leucophylla*, and then formulate corresponding greening measures for different types of slope rock formations, sow wildflowers, plant *Crassulaceae* plants suitable for site growth, and restore the quarry habitat. Relying on the unique landforms of the mine pit creates a variety of recreational places, reproduces the cultural memory of quarrying, and brings visitors a rich visiting experience.

Strategies 4- Activating

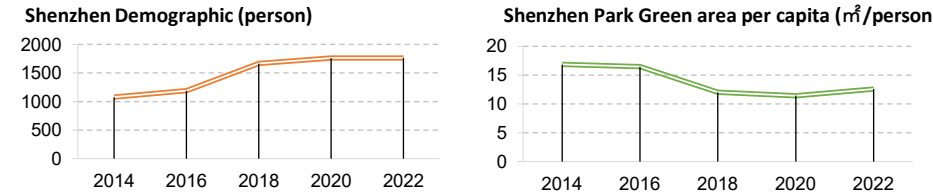
Combined with the greenway loop, four themed trails are set up for different groups of tourists, including the rural experience trail, health and wellness trail, outdoor hiking trail, and science and research trail. A variety of activities are planned throughout the year for tourists to choose from. Eight rest stations are set up along the entire greenway. Complete supporting basic service facilities, such as seats, rest corridors, direct drinking water, signboards, etc., are added with multi-functional lamp poles, smart running poles, smart guide signs, and other smart facilities to achieve full coverage of informatization and create an organic smart greenway that integrates smart sports, smart operations, and smart management and maintenance.

Conclusion

Siji Greenway could connect the city and landscape space, activate multiple ecological patches such as reservoirs, farmlands, and forests, and create eco-friendly, recreational, and museum-style landscape-themed greenway, improving the quality of life of nearby residents, promoting the construction of a livable city in Shenzhen, increases the attractiveness of the area, and becomes a beautiful example of harmonious coexistence between man and nature.

BACKGROUND

With the advancement of urbanization and the continuous growth of population, the contradiction between the increase in population and limited urban green space has become more serious.



From 2020 to 2022, Shenzhen's "Mountains and Seas Connecting City" plan has initially achieved results, and the per capita park green space area has increased, but there is still a large gap compared with 2014.



CHALLENGES



Obstructed View

- Fence barrier
- Plant shading



Inconnective Pathway



- Mixed traffic of people and vehicles
- Not suitable for barrier-free access
- No road



Single Plant Landscape



- Exposed rock formations
- Invasive alien species
- Tangled vegetation

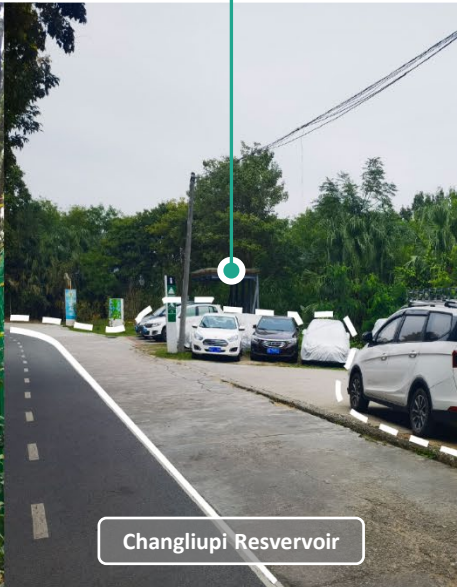


Water Pollution

- Eutrophication of water bodies
- Farmland and domestic wastewater pollution



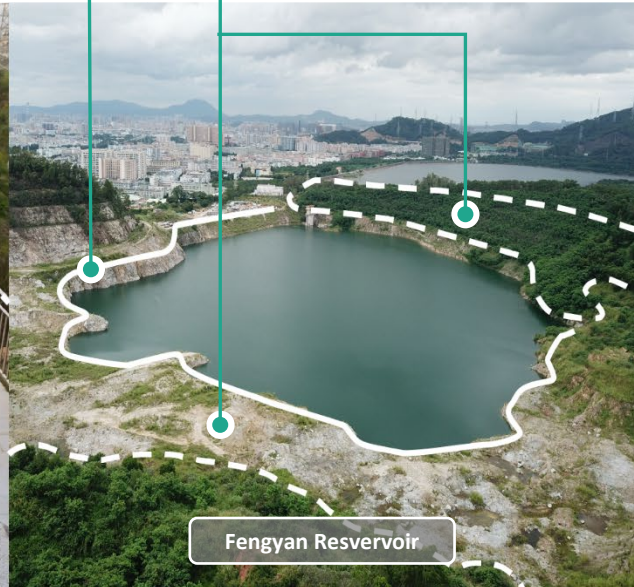
Wushan Reservoir



Changliupi Reservoir



Wuzhipa Reservoir



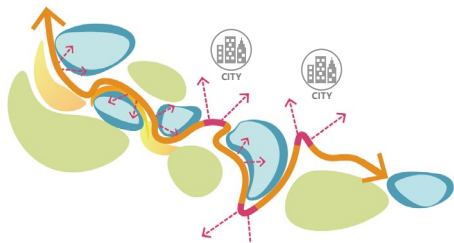
Fengyan Reservoir



Qili Reservoir

OVERALL STRATEGY

1 CONNECTING



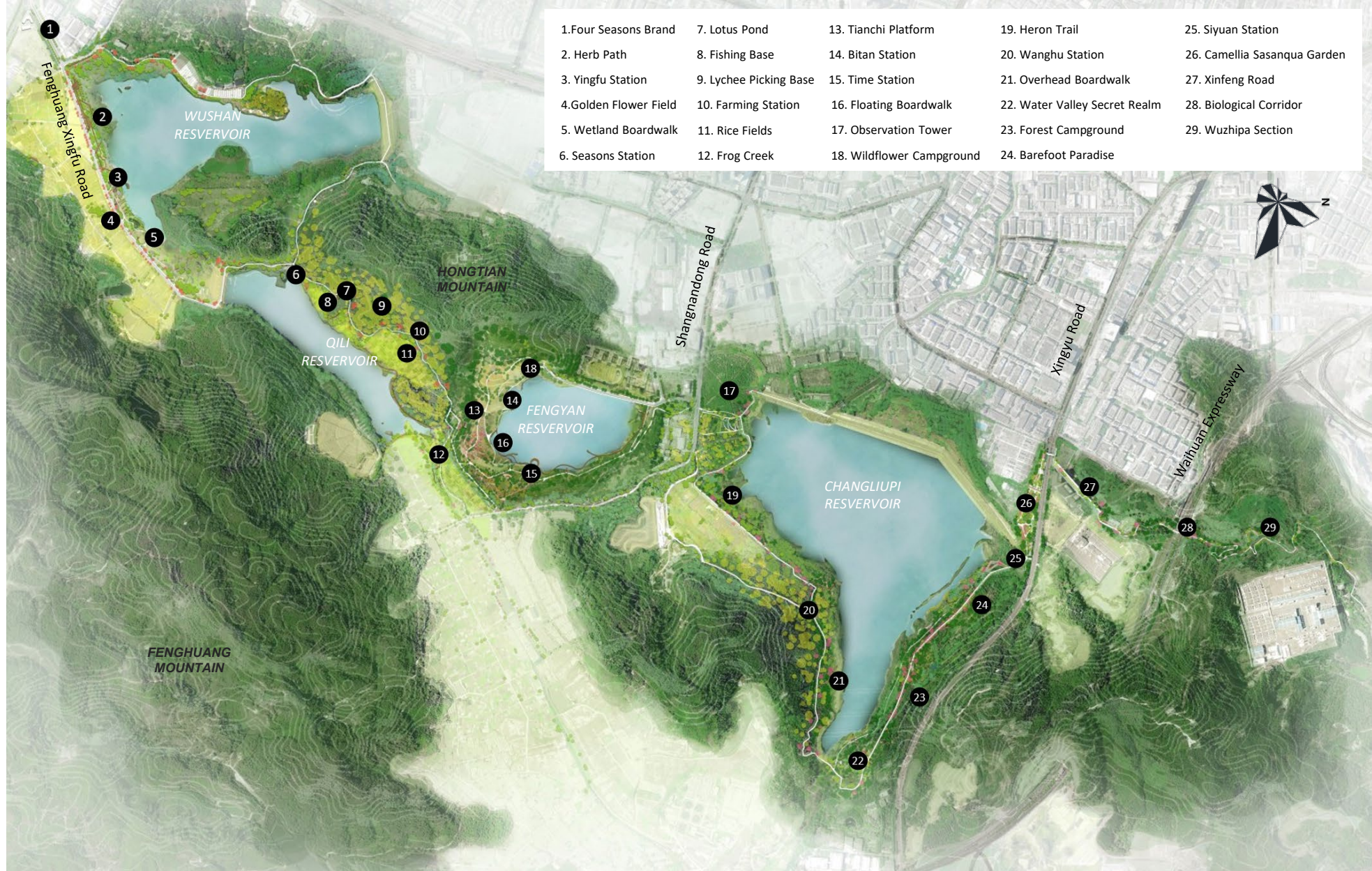
2 PROTECTING



3 RESTORING



4 ACTIVATING



1 Connecting

CONNECTING ECOLOGICAL PATCHES AND URBAN TRAILS

The project relies on Provincial Greenway Line 2, connecting **4 greenways, 5 reservoirs, 6 parks and multiple outer suburban natural trails**, connecting people and nature, and integrating mountainous resources into the city.

It aims to create a Xinqiao Intelligent Innovation City dominated by the new generation of information technology and driven by innovation.

It is one of the ancient building complexes with the largest number of ancient building units, the largest area, and the best-preserved village-style Guangfu architectural style in southern China in Shenzhen.

XINQIAO EAST RENEWAL UNIT

FENGHUANG ANCIENT VILLAGE

FENGHUANG COMMUNITY PARK

WUSHAN RESERVOIR

FARMLAND

FENGHUANG MOUNTAIN

HONGTIAN MOUNTAIN

QILI RESERVOIR

FENGYAN RESERVOIR

CHANGLIUPI RESERVOIR

XINYU ROAD PARK

WUZHIPA RESERVOIR

WUZHIPA SPORTS PARK

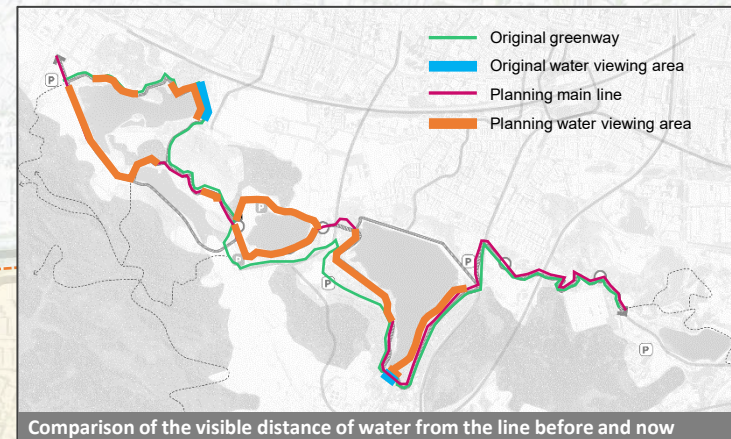
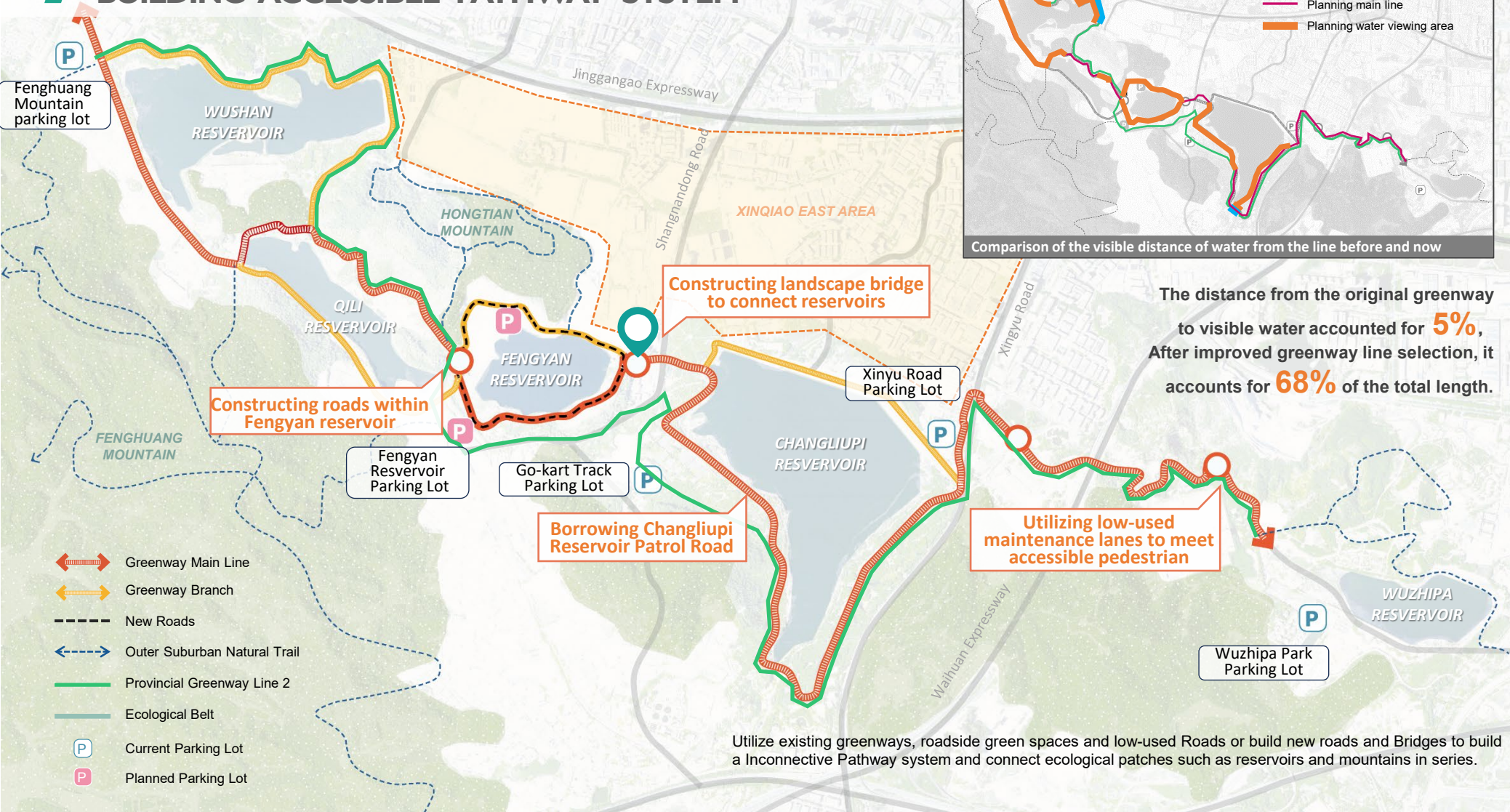
WUZHIPA FOREST PARK

Provincial Greenway Line 2

- Greenway Main Line
- Greenway Branch
- Outer Suburban Natural Trail
- Provincial Greenway Line 2
- Ecological Belt
- Ecological Belt
- Viewing Platform



1 Connecting BUILDING ACCESSIBLE PATHWAY SYSTEM



The distance from the original greenway to visible water accounted for **5%**, After improved greenway line selection, it accounts for **68%** of the total length.

Utilize existing greenways, roadside green spaces and low-used Roads or build new roads and Bridges to build a Inconnective Pathway system and connect ecological patches such as reservoirs and mountains in series.



Improve Roads



Construct Roads



Construct Bridge



Borrow low-used Roads

1 Connecting OPENING FOUR RESERVOIRS

Clear plants & Open fences & Build observation tower and viewing platforms

We will tidy up the vegetation along the greenway, open the reservoir fence and move it out of sight, add viewing platforms and watchtowers to overlook the lake view and water birds.

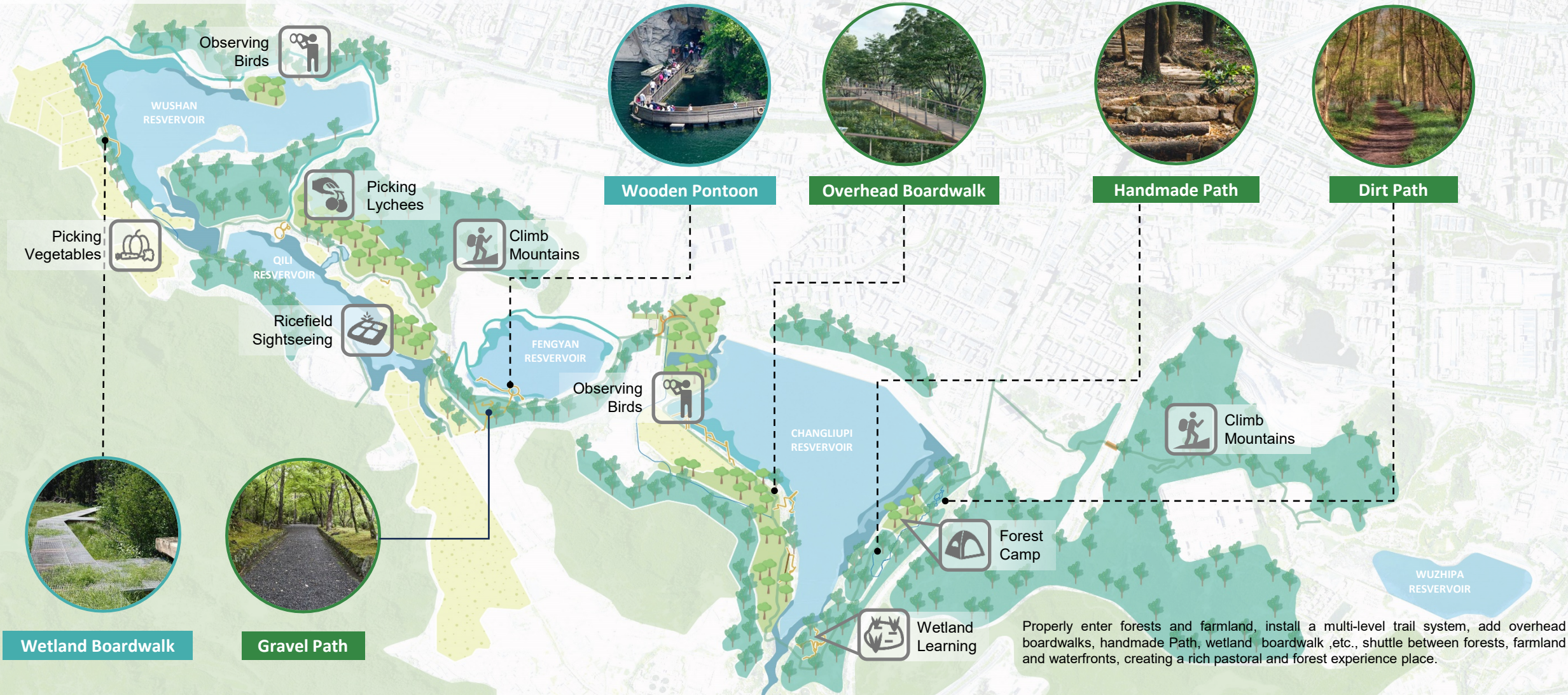
Build observation tower



Clear plants & Build viewing platforms



1 Connecting PROPER SHARING OF FORESTS AND FARMLAND





Lychee Picking Garden



Forest Playground



Forest Campsite



Qili Reservoir Sightseeing Farmland

2

Protecting
BIOLOGICAL MONITORING AND INVESTIGATION

During the animal survey, **two first-class national protected animals** were found, namely **the Oriental White Stork and the Black Stork**. **Two second-class national protected animals** were also found, namely **leopard cat** feces and road-killed **tiger frogs**.

FIELD RESEARCH



- 9 ZOOLOGICAL SURVEY
- 4 BIRD SURVEY
- 3 MAMMAL SURVEY
- 2 AMPHIBIAN SURVEY

6 MONTHS INFRARED CAMERA SHOT

Place 5 infrared cameras

The infrared camera captured leopard cats operating in WS1, HS2, and CLP4, indicating that the ecosystem integrity in this area is relatively good.

BIOMONITORING



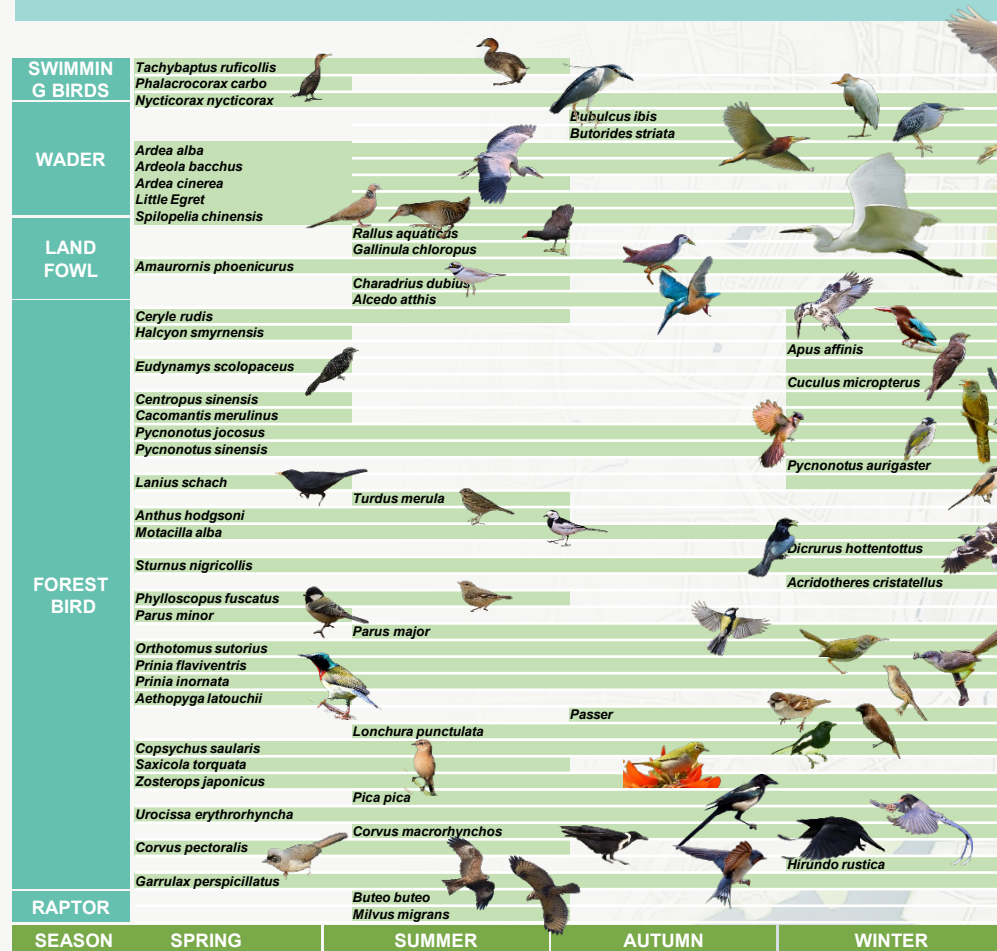
Infrared Camera Layout Location

	Location	Coding	Latitude And Longitude	Altitude	Date	Reasons For Site Selection
1	Wushan Reservoir	WS1	22.700382 113.844955	53m	August 15	Fruit Forest Habitat
2	Hongtian Volcano Park	HS2	22.702523 113.853776	120m	August 15	
3	East Side Of Qili Reservoir	QL3	22.697426 113.859977	119m	August 15	Connect To Fenghuang Mountain
4	East Side Of Changliupi Reservoir	CLP4	22.716884 113.871385	102m	August 16	
5	North Side Of Xinyu Road	XY5	22.727250 113.870826	76m	August 16	Highway Separation

2 Protecting BIOLOGICAL SPECIES STATISTICS

2 NATIONAL FIRST-LEVEL PROTECTED ANIMALS

4 NATIONAL SECOND-LEVEL PROTECTED ANIMALS



We observed over 40 species of birds, 9 of which were waterbirds. Most of them live in the southwest corner of the reservoir and the shallows to the east.

Prionailurus bengalensis
National second-level protected animals

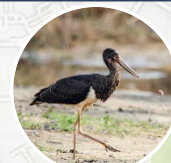
Ciconia nigra
National first-level protected animals

Hoplobatrachus rugulosus
National second-level protected animals

Otus lettia
National second-level protected animals

Gorsachius melanolophus
National second-level protected animals

Ciconia boyciana
National first-level protected animals



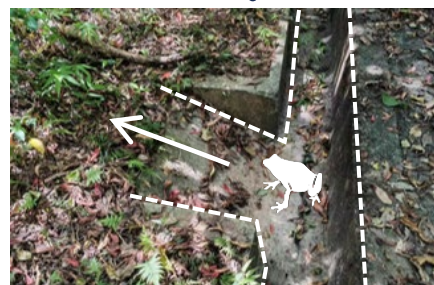
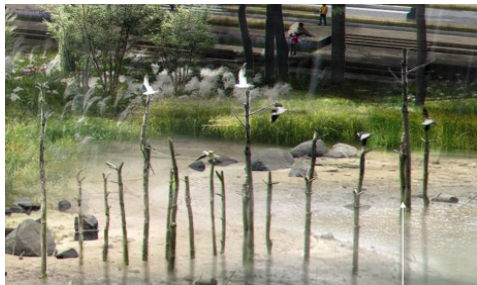
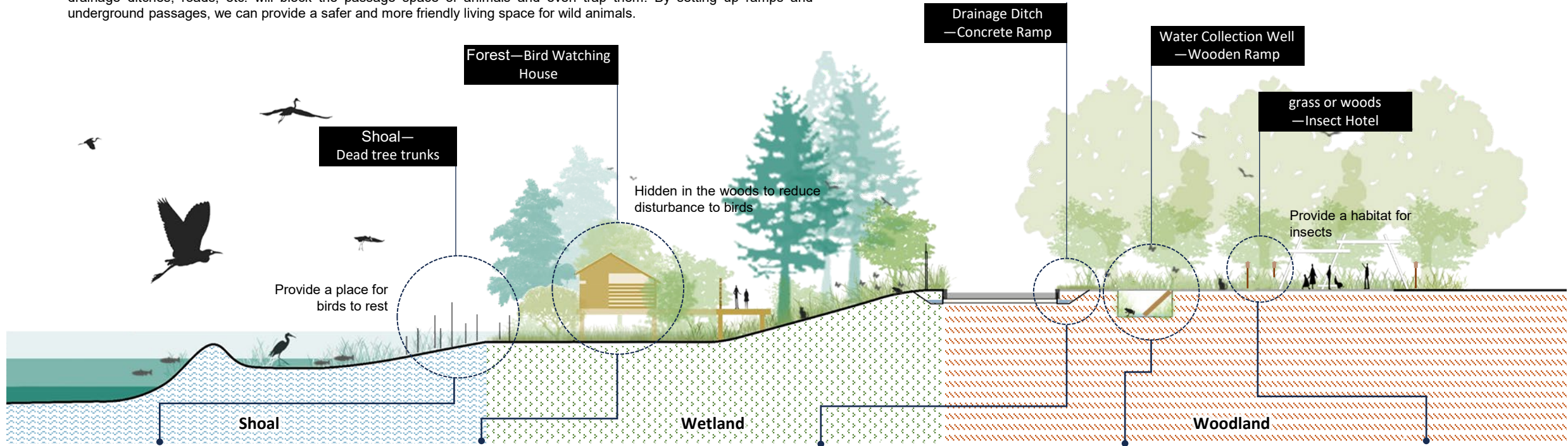
2 Protecting BUILDING BIOLOGICAL CORRIDORS

Greenway is equipped with biological covered bridges, green belts, underground pipes, etc., to build a biological corridor connecting Fenghuang Mountain to Wuzhipa Forest Park to achieve barrier-free access for animals in the two places.



2 Protecting BUILDING BIO-FRIENDLY FACILITIES

According to preliminary ecological surveys, it was found that some man-made facilities such as water collection wells, drainage ditches, roads, etc. will block the passage space of animals and even trap them. By setting up ramps and underground passages, we can provide a safer and more friendly living space for wild animals.



2 Protecting BUILDING ANIMAL AND PLANT SCIENCE EDUCATION AREA

Create a scientific education place for wetland animals and plants, set up plank roads and interactive scientific education facilities, so that people can better understand these natural creatures.

Dead Tree Trunks

Insect Hotel

**Science Education
Brand**

昆虫观察站

Listen To The Frog's Voice

盛夏的夜晚，蛙鸣溪流的蛙鸣总会此起彼伏，那知鼓声般的乐曲，是夏天雄壮的乐章。

你知道这些青蛙在给谁唱歌吗？

这里会唱歌的蛙都是雄性蛙。它们通过咽下的声囊发出声音，用音乐吸引雌性青蛙。

像很多鸟叫之声，需力得特殊的空气流经它的口腔中，然后经舌口腔口，再送入人耳。当舌等器官时，引起声音发生并传。青蛙叫声和鸟叫声不同。

不同的种类，声量的数量也不一。比如花斑蛙叫，浑身都有个响亮的地下声量。成蛙雄：舌头特别有个明显的响声。被腹这则说明有不太明显的声音。

在树林里，除了听到叫蛙的叫声外，还可以见到青蛙的不同形态，了解它们的一生。

The life of frog

口部
皮肤腺
肺
胃
肠
肝
肾
心
膀胱

卵
蝌蚪
幼蛙
成蛙
回到卵

Turn It

起头来有些奇怪的问题吗？请试一试！

The body shapes of different adult frogs vary

Turn It

Turn It

Turn It

蛙 成蛙体长2.1-2.5cm

蟾蜍 成蛙体长2.0-2.5cm

两栖爬行动物 成蛙体长1.1-3.5cm


 薄趾蛙 成蛙体长5.0-5.5cm

 宽眼泛树蛙 成蛙体长5.7-6.5cm

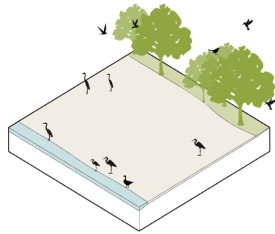
 花背口蛙 成蛙体长6.3-6.8cm

3 Restoring REPAIRING RESERVOIR SHORELINE

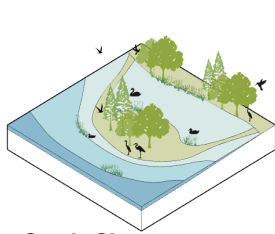
Richer Terrain

Based on the Current Topography, Create a Variety of Landforms to Provide a Rich Habitat for birds.

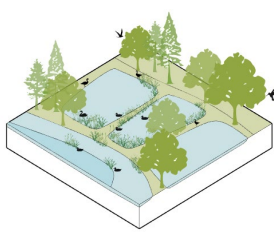
Shoals



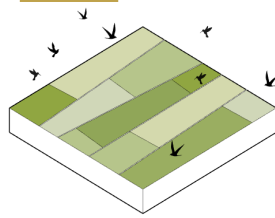
Island



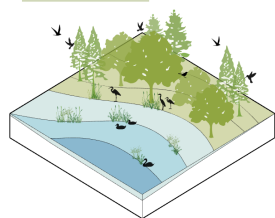
Low-lying Pond



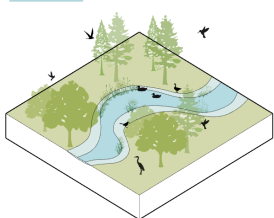
Farmland



Gentle Slope

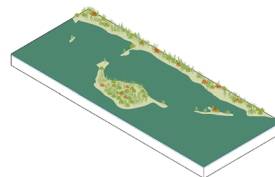


stream

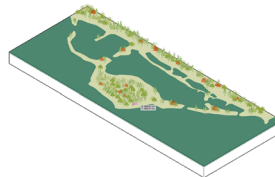


Suitable Water Level

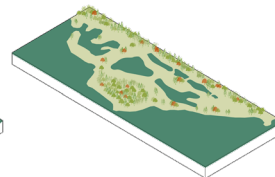
Through Water Level Management, the Site has a Suitable Environment for birds Habitat at Different Water Levels.



High Water Level



Normal Water Level



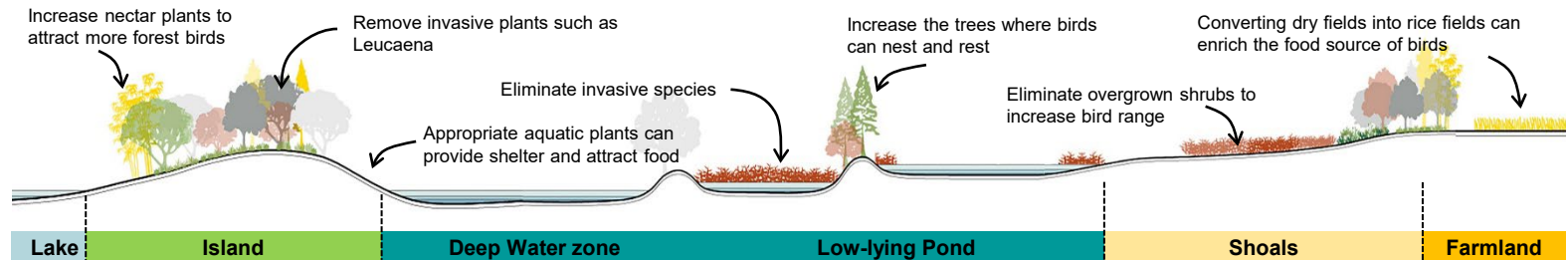
Low Water Level



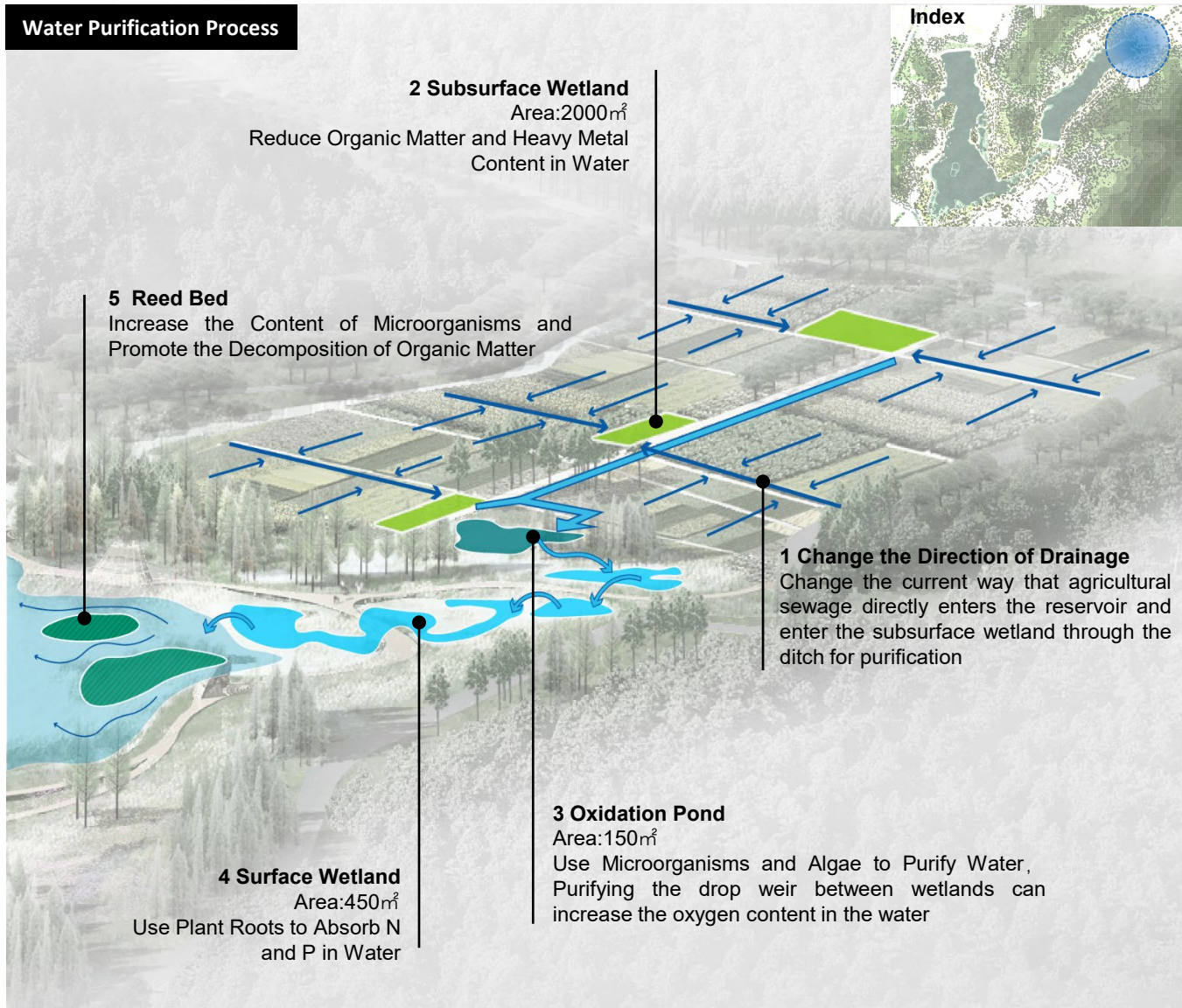
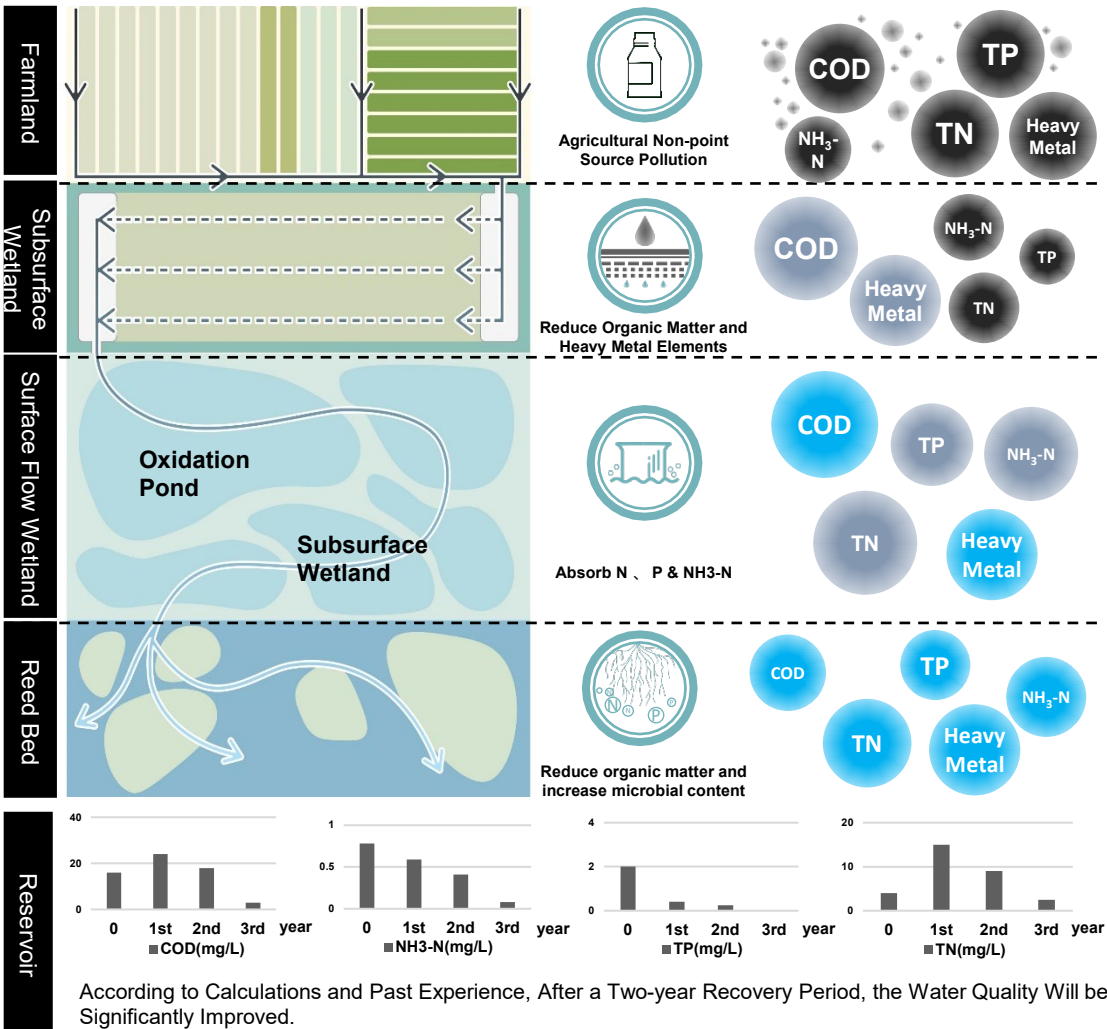
Phytoremediation Measures

- Current Vegetation:** Keep trees of ecological value
- Remove:** Remove invasive species and overly flourishing plants

- Plant:** Planting plants that are beneficial for restoring the habitat of birds
- Replace:** Replace plants that are not conducive to the restoration of birds habitat



3 Restoring IMPROVING RESERVOIR WATER QUALITY



3 Restoring IMPROVING RESERVOIR WATER QUALITY

Through methods such as replenishing water from reservoir, we can increase the amount of water in streams, and use topographic height differences to create cascading wetlands, enrich animal and plant communities, and improve reservoir water quality.



Viewing platform

EVAPORATE

SURFACE RUNOFF

Helophyte



Firefly



Frog



Turtle

Multi-level water stacking
increases the oxygen
content in the water

SURFACE RUNOFF



Loach



Shrimp



Fish



Snail



Aquatic And Hygrophytes

Waterfront
Boardwalk

Soil Filtration
The pebbles

SEEP

SEEP



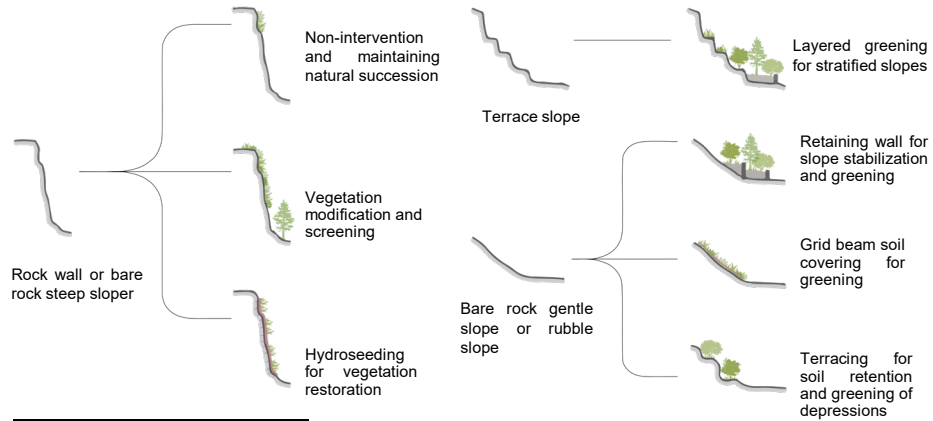
Decomposer

SEEP

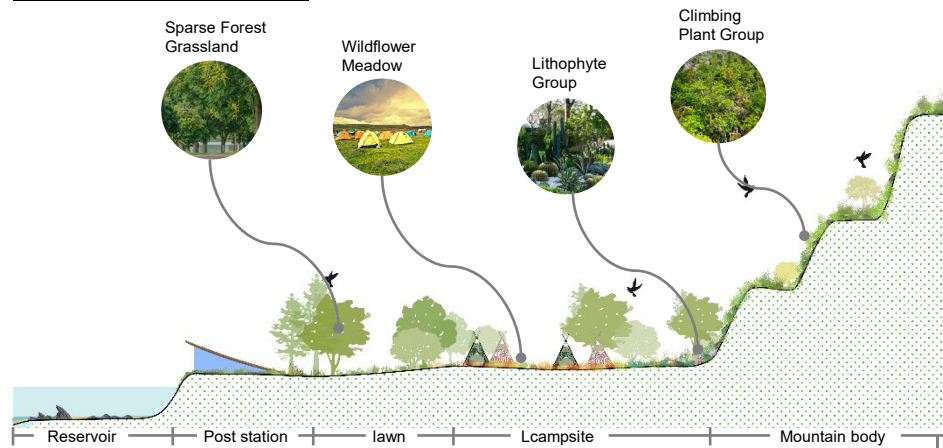
3 Restoring REPAIRING THE QUARRY ECOLOGY

First, sort out the vegetation on the site and clean up invasive plants, and then formulate corresponding regreening measures for different types of rock formations to restore the quarry habitat.

Quarry Regreening Measures



Vegetation Style Type



Plant Variety Arrangement



3 Restoring QUARRY RESTORATION — CREATE DIVERSE RECREATIONAL AREAS

Relying on the unique landforms of the quarry, we create diversified recreational venues such as wildflower camps, water pontoons, rock gardens, waterfalls, etc., to provide visitors with a rich visiting experience.



Moon Embrace Platform



Time Waterfall



Bitan Station



Wildflower Campground

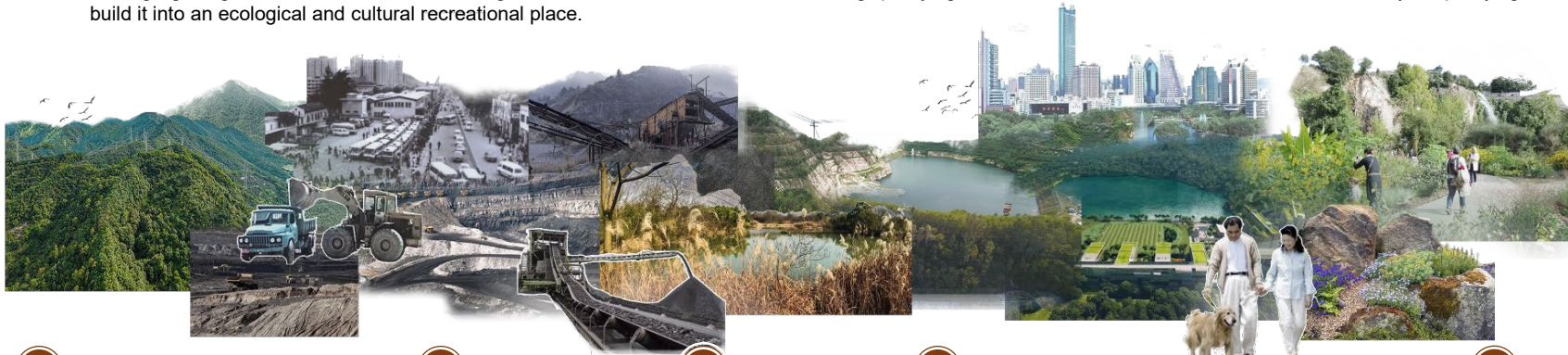


Geology Exhibition Stand



3 Restoring QUARRY RESTORATION — REPRODUCE CULTURAL MEMORY

Through geological science education, viewing booths, waterfall installations simulating quarrying scenes, etc., we will recreate the cultural memory of quarrying and build it into an ecological and cultural recreational place.



1975 Mountain 1993 Quarry 2006 Separate mountain 2018 Restoration (future) Ecological culture



Cliff Wildflower Campground



Geological Museum Wall



Lithophyte Botanical Garden



Water Floating Boardwalk

4 Activating QUESTIONNAIRE SURVEY

Questionnaire Survey Release

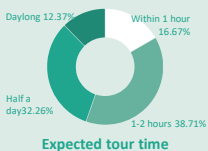


In the early stage of the project, questionnaires were posted on various websites to collect public opinions. **Based on the results, node design was carried out and theme trails and activities were planned.**

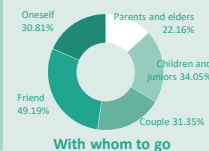
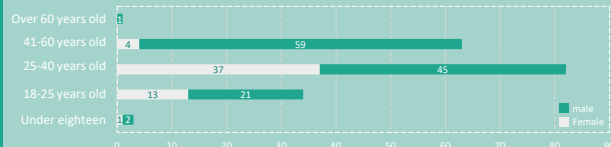
Interviewed public information



The respondents were mostly young and middle-aged.
People generally stay in the greenway for more than 1 hour to about half a day, and more friends or relatives go together.



More concerned about the greenway experience ranking



Greenway Experience

More concerned about the greenway experience ranking

70.65%
Four seasons plant scenery viewing

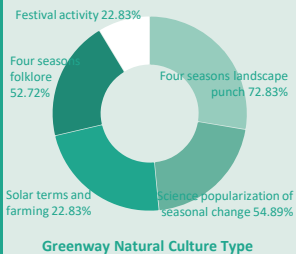
69.02%
Barrier-free slow travel

65.22%
Nature tour

44.02%
Education and popular science
36.96%
Play wild
.....



In terms of greenway experience, tourists pay more attention to plant appreciation, slow walking experience and sightseeing experience, and plant landscapes tend to be natural and wild and colorful, hoping to feel the four seasons through solar terms, farming culture, and the science of the four seasons of plants and animals.



Greenway Activity

Hydrophilic activity

68.85% | Wetland stream tracing

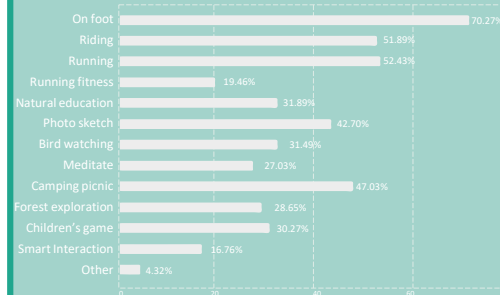
45.36% | Catch fish and shrimp

35.52% | Go fishing

71.04% | Watch the water

8.2% | other

Activities to be carried out on the Four Seasons Greenway



In terms of greenway activities, they tend to hike, ride and run, camping and picnic, and photography and sketching; reservoir activities tend to watch water and stream; farm activities like flower field sightseeing, fruit and vegetable picking, nature education, etc.

Service

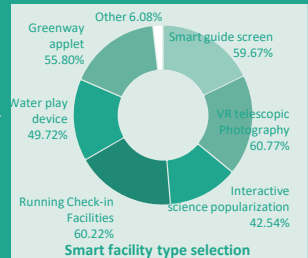
Station service at Siji Greenway



In the greenway paving is more inclined to choose gray, hoping to provide public toilets, water bars, automatic sales and other station services



In terms of smart facilities, the public hopes to have VR telescopes, AI punch card devices and smart navigation screens



Smart Facilities

4 Activating PLANING MULTIPLE THEMED TRAILS



TOUR 1

Outdoor Adventure

TOUR 2

Health Preservation

TOUR 3

Pastoral Experience

TOUR 4

Nature Studies



Fitness Jog



Climb high and look far



Campsite



Fruit picking



Go fishing



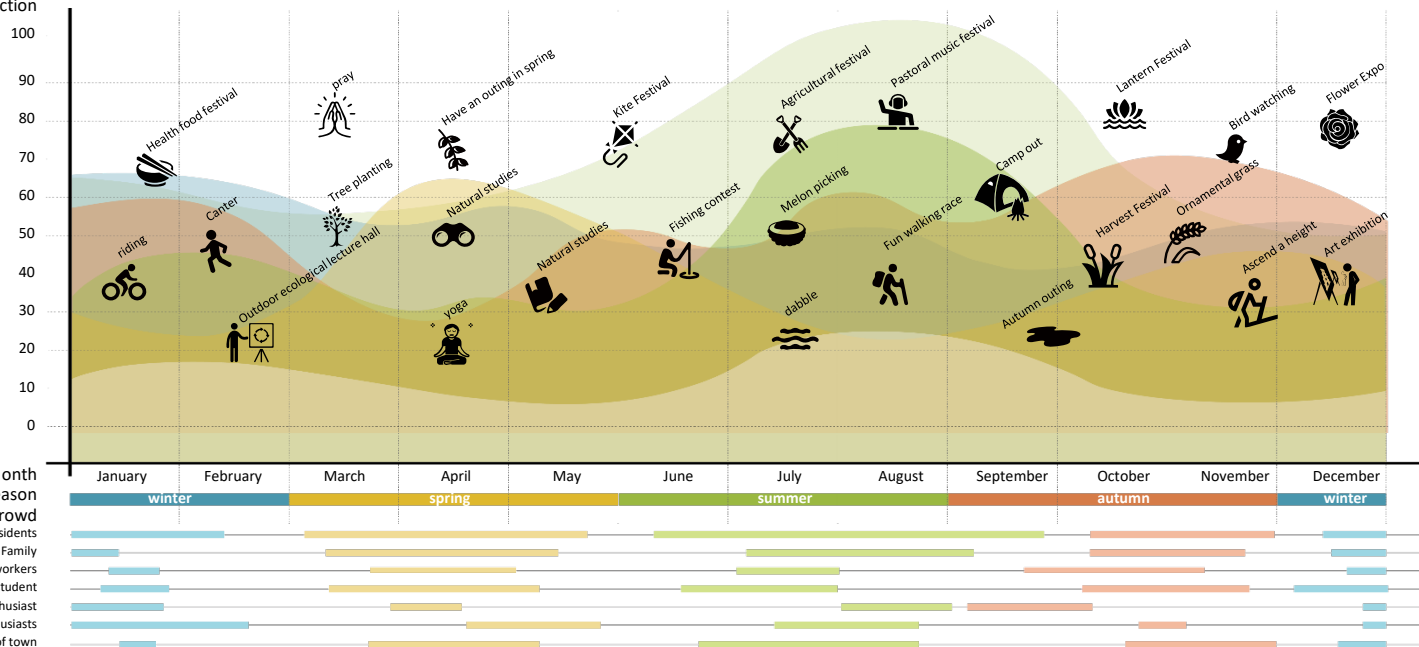
Bird watching



Viewing deck

Crowd Heat Prediction

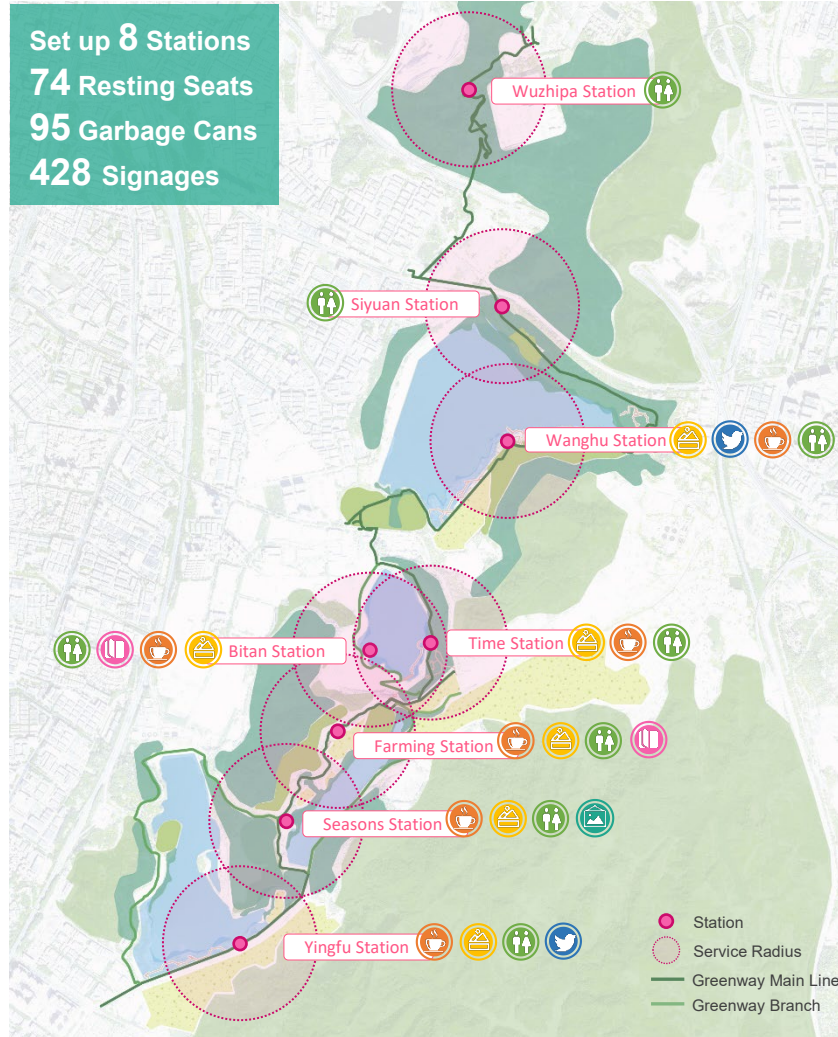
Organize year-round activities to meet the needs of people of all ages



4 Enriching Activities

IMPROVING BASIC SERVICE FACILITIES SYSTEM

Set up 8 Stations
74 Resting Seats
95 Garbage Cans
428 Signages



Basic Service Facilities



Signage Board & Science Board



Seasons Station



Farming Station



Bitan Station



Yingfu Station



Yingfu Station



Wanghu Station

4 Activating STATION HIDDEN IN THE FOREST

Multi-level resting
platform

Water bar area

A quiet place was chosen in the forest to set up a station, providing a leisurely and relaxing tea room space for passers-by.

4

Activating STATION NEAR THE WATER



The station is based on the theme of the cycle of the four seasons, creating a nature education center with the themes of the twelve solar terms and traditional farming culture. The selection of building materials also refers to many Hakka architectural elements.

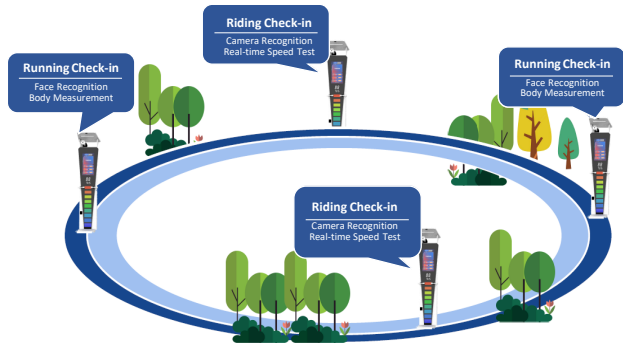


4 Activating REALIZING SMART TECHNOLOGY INTERCONNECTION

Smart Service



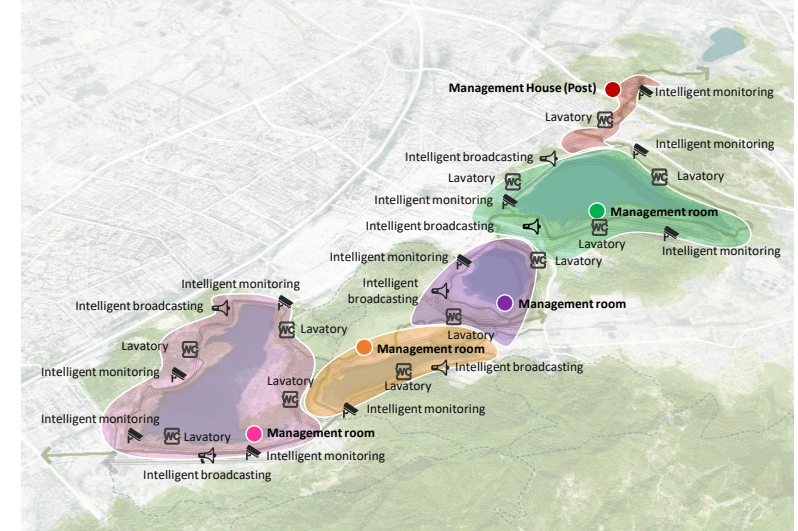
Smart All-age Exercise Ring



Smart Applets



Smart Management





Escape from the city, run to the mountains, and shuttle between reservoirs, farmlands, and forests to explore the wonders of nature. This is a silent dialogue about the harmonious coexistence of man and nature.